Occupational Space Medicine

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Learning Objectives

- 1) Understand the unique work environment of astronauts.
- 2) Understand the effect microgravity has on human physiology
- 3) Understand how NASA Space Medicine Division is mitigating the health risks of space missions.

Space Environment

- Reduced Gravity
- Radiation
- Vacuum
- Debris
- Temperature extremes

S124E005419

Space Craft Environment

- Isolation and confinement
- Noise and Vibration
- Closed loop environment (life support)
- Payloads and construction activities
- Waste production

Space Flight Mission

- Flight activity Launch and Reentry Forces
- Remoteness and communication access
- Circadian rhythms and crew schedule changes
- ExtraVehicular Activity (EVA)

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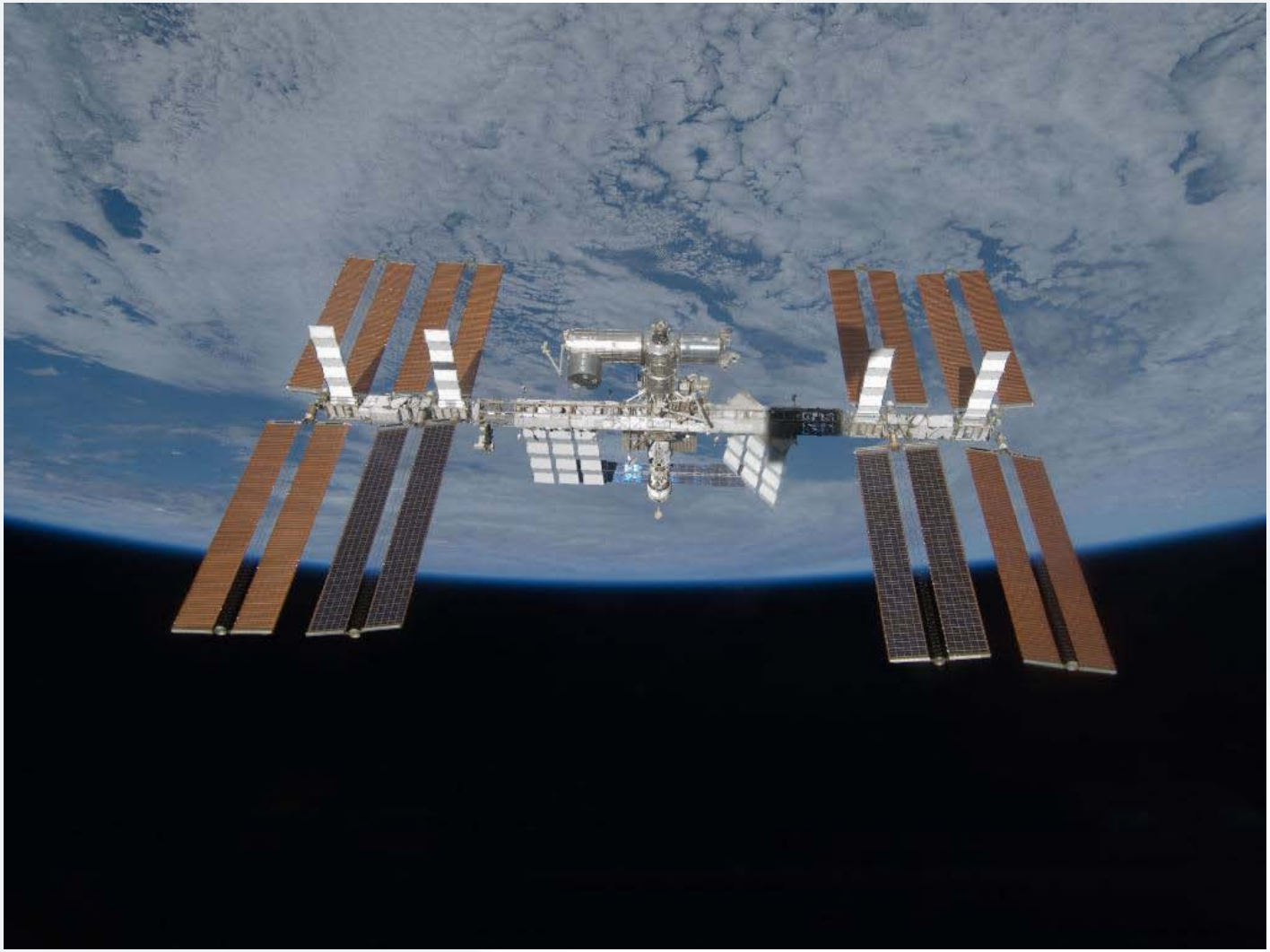
Medical Versus Occupational Surveillance

- Medical- What risks you bring to the table (cholesterol, hypertension, etc)
- Occupational- What risks you come away with a result of the occupation

The Work Environment



Controls

- OSHA and NIOSH do not dictate controls or reporting for space work
- Ethical and moral obligation to perform surveillance, but no legal obligation currently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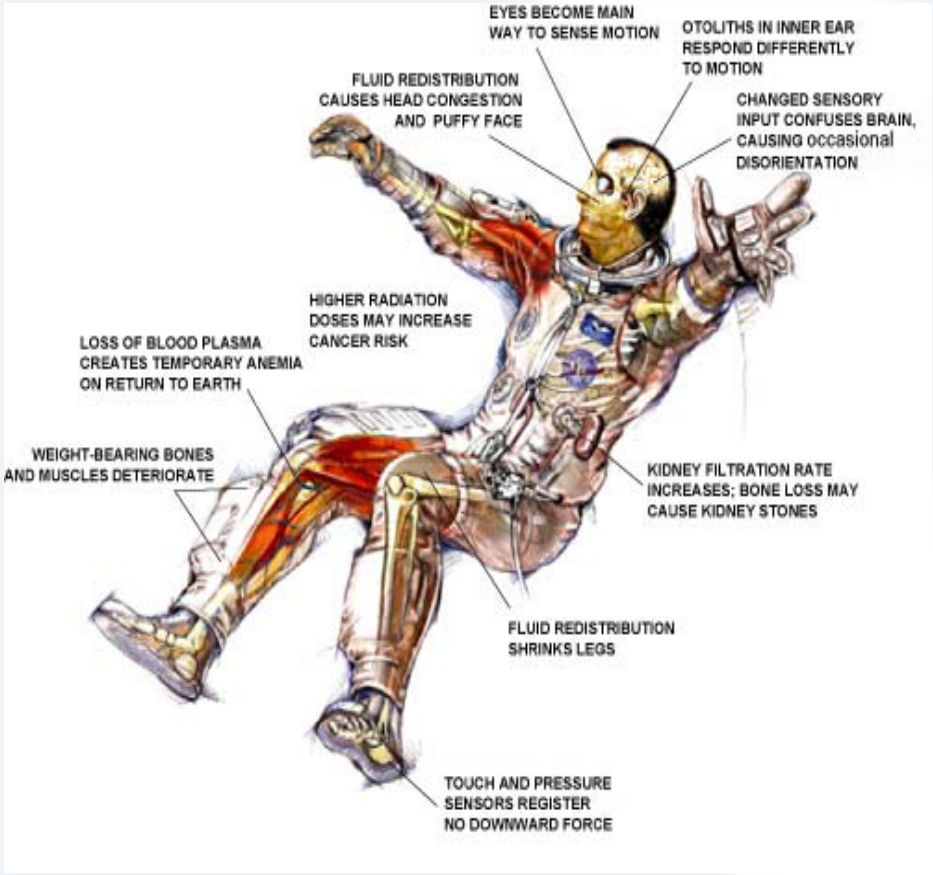
Occupational Hazards in Space



- Radiation of the Space Variety
- Microgravity
- Circadian Rhythm Disruption
- Noise
- Carbon Dioxide
- Lasers
- Rocket propellants

From Scientific American

Lifetime Surveillance of Astronaut Health (LSAH)

- Benchmarked off of similar programs in DoD and the Department of Energy
- Allows insight into long-term sequelae from exposures in the workplace

Search Publicly Available Information and Data

RSS

Experiment | Mission | Personnel | Biospecimens | Documents | Hardware | Dataset | Photo Gallery

Data Request

Data can be requested from one or both repositories.

NASA Human Research Program (HRP)

Research Data Repository: Life Sciences Data Archive (LSDA)

NASA Space Medicine

Medical Data Repository: Lifetime Surveillance of Astronaut Health (LSAH)

The Lifetime Surveillance of Astronaut Health (LSAH) is a proactive occupational surveillance program for the astronaut corps to screen and monitor astronauts for occupational related disease. The LSAH Repository (LSAH-R) was established to implement a research component to enable analysis of astronaut medical data.

More about LSAH: LSAH Home | Publicly Available Information & Data

Images Added to the Archive

Missions or Studies in Progress

Campaign 17	ECP	ROI	Campaign 11	Expedition 30
				
+ Learn more	+ Learn more	+ Learn more	+ Learn more	+ Learn more

Brief History of Longitudinal Study of Astronaut Health

- Phase 1
- Phase 2
- Workforce controls for comparison
- Low Statistical Power
- No Consent

Institute of Medicine Recommendations

1. Must serve two sometimes conflicting goals of research and occupational surveillance...
2. No comparison group can meet every goal or need, it should be individualized...
3. Increase the quality and quantity of preventive care to increase the data...
4. NASA should assume responsibility for the lifelong health care of its active and former astronauts.

New LSAH

- Preventive Medicine Protocols
  - Age Based (40, 45, 50, 60, etc)
  - Ultrasound
  - Mammography
  - MRI
  - Colonoscopy
  - Stress Test
  - Complete Physicals
  - Derm Surveys
  - DEXA
  - Etc, etc.

- Occupational Health Surveillance Protocols
  - Radiation
  - Bone
  - Eye
  - Cadmium
  - Hydrazine
  - Lead
  - etc, etc.

Improving the Research

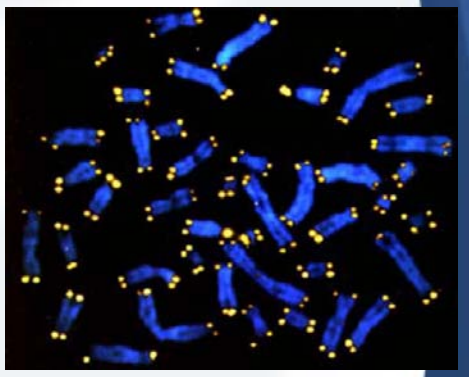
Before

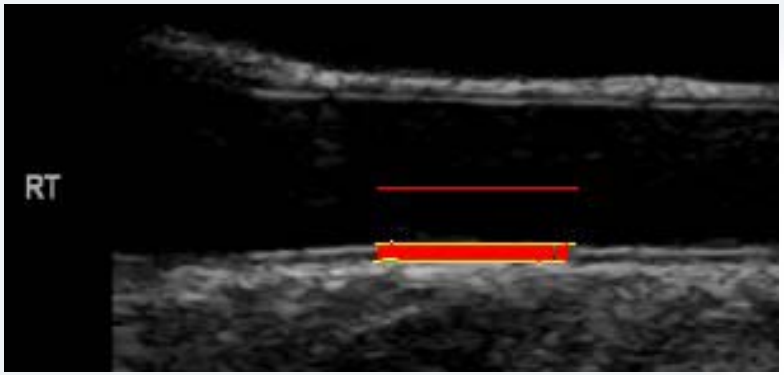
- Query the data and compare to 3 NASA workers for each astronaut....
- No consent obtained, just implied.
- Poor statistical power.
- No flight data incorporated!!!!

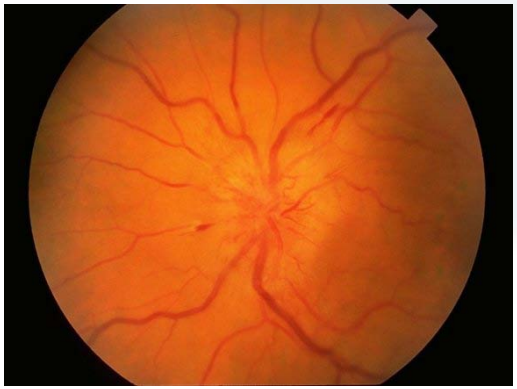
After

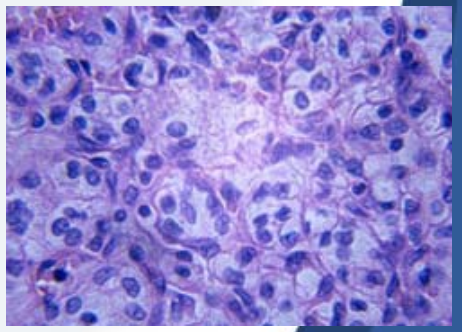
- Query the database and find the best comparison group to answer the question being asked
- Much more statistically powerful.
- Consent for direct studies, no consent needed for generic occ health trends.
- Flight data incorporated.

Identifying long term health risks and employing preventive medicine









Your Health is Our Mission

Occupational Surveillance for Spaceflight

- Meets Ethical and Moral obligation
- Increases data available to research
- Identifies and prevents exposure related disease
- Allows feedback into spacecraft design
- Allows NASA to follow long term health impacts